

CLAIMS

What is claimed is:

1. A process for producing sterols, said process comprising:
 - (a) providing an oil distillation residue, said residue comprising sterol esters and partial glycerides;
 - (b) transesterifying the partial glycerides with a lower alcohol in the presence of a basic catalyst under mild transesterification conditions to form fatty acid alkyl esters and glycerol;
 - (c) removing excess lower alcohol, the basic catalyst, the glycerol and the fatty acid alkyl esters, to form a bottom product comprising the sterol esters; and
 - (d) transesterifying the sterol esters at a temperature of from 90°C to 145°C and a pressure of from 2 to 10 bar for a period of 4 to 10 hours to form free sterols.
2. The process according to claim 1, wherein the oil distillation residue is vegetable oil-derived.
3. The process according to claim 1, wherein the oil distillation residue comprises a residue derived from an oil selected from the group consisting of soybean oil, sunflower oil, rapeseed oil, coconut oil, palm oil, palm kernel oil, and mixtures thereof.
4. The process according to claim 1, wherein the transesterification of the partial glycerides under mild conditions is carried out at a temperature of from 115°C to 145°C and a pressure of from 2 to 10 bar, for a period of from 5 to 20 minutes.
5. The process according to claim 1, wherein the transesterification of the partial glycerides under mild conditions is carried out at a temperature of from 120°C to 130°C and a pressure of from 2 to 10 bar, for a period of from 8 to 15 minutes.
6. The process according to claim 1, wherein the lower alcohol comprises methanol.
7. The process according to claim 1, wherein removing excess

lower alcohol comprises allowing expansion until the reaction temperature has cooled to a temperature of from 65°C to 85°C.

8. The process according to claim 4, wherein the lower alcohol comprises methanol.

9. The process according to claim 4, wherein removing excess lower alcohol comprises allowing expansion until the reaction temperature has cooled to a temperature of from 65°C to 85°C.

10. The process according to claim 1, wherein the removal of the basic catalyst comprises the addition of an aqueous solution of an acid, precipitation of the catalyst and separation of the precipitate.

11. The process according to claim 1, wherein the fatty acid alkyl esters are removed by distillation.

12. The process according to claim 11, wherein the distillation is carried out at a temperature of from 170°C to 200°C and a pressure of from 1 to 5 mbar.

13. The process according to claim 4, wherein the fatty acid alkyl esters are removed by distillation.

14. The process according to claim 13, wherein the distillation is carried out at a temperature of from 170°C to 200°C and a pressure of from 1 to 5 mbar.

15. The process according to claim 8, wherein the fatty acid alkyl esters are removed by distillation.

16. The process according to claim 15, wherein the distillation is carried out at a temperature of from 170°C to 200°C and a pressure of from 1 to 5 mbar.

17. The process according to claim 1, wherein the transesterification of the sterol esters is carried out at a temperature of from 120°C to 130°C and at a pressure of from 2 to 10 bar, for a period of from 5 to 8 hours.

18. The process according to claim 1, further comprising purification of the free sterols via crystallization and washing.

19. A process for producing sterols, said process comprising:

(a) providing an oil distillation residue derived from an oil selected from the group consisting of soybean oil, sunflower oil, rapeseed oil, coconut oil, palm oil, palm kernel oil, and mixtures thereof, said residue comprising sterol esters and partial glycerides;

(b) transesterifying the partial glycerides and the free fatty acid-based partial glycerides with methanol in the presence of a basic catalyst at a temperature of from 115°C to 145°C and a pressure of from 2 to 10 bar, for a period of from 5 to 20 minutes, to form fatty acid methyl esters and glycerol;

(c) removing excess methanol, the basic catalyst, and the glycerol, and distilling off the fatty acid methyl esters at a temperature of from 170°C to 200°C and a pressure of from 1 to 5 mbar, to form a bottom product comprising the sterol esters; and

(e) transesterifying the sterol esters at a temperature of from 90°C to 145°C and a pressure of from 2 to 10 bar for a period of from 4 to 10 hours to form free sterols.